REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested.

This Amendment is in response to the Office Action dated May 16, 2005. By the present amendment, claim 25 has been amended to correct the minor informality noted in paragraph 2 on page 2 of the Office Action. Therefore, reconsideration and removal of the 35 USC §112, second paragraph, rejection set forth in paragraphs 1 and 2 of the Office Action is respectfully requested.

Also by the present Amendment, the pending claims have been amended, where appropriate, for clarification of the invention. In addition, new dependent claims 27 and 28 have been added to further define certain features of the invention.

Reconsideration and removal of the 35 USC §103(a) rejection of claims 20-26 over the combination of Newman (USP 5,237,205), Schueller (USP 5,866,949), and Wakana (JP 10-110057A) is respectfully requested.

Briefly, the present invention is directed to an improved wiring tape for a semiconductor device which is particularly designed to relax thermal stress which is generated between the semiconductor chip and a package substrate during heating. In addition, the wiring tape of the present invention is also constructed to permit the release of steam pressure generated during heating in a reflow operation used for forming the package substrate (e.g., see page 6, lines 1-14).

In order to accomplish these objects, the present invention utilizes a three layer buffer elastomer layer (e.g., see page 33, line 2) such as shown in Fig. 2A, (noting that reference to Fig. 2A is solely for purposes of example). As can be seen in this structure, the three layered buffer elastomer layer includes a core layer 1

having either interconnected foams or a three-dimensional reticular structure with adhesive layers 2 formed on each side of the core layer (e.g., see page 17, line 22 et seq.). This three layer buffer elastomer layer is specifically used to bond the chip 5 to the wiring formed side of a wiring layer comprised of an insulating film 3 and wiring 4. By virtue of the specific arrangement of this particular three layer buffer elastomer layer between the chip 5 and the wiring formed side of the wiring layer, thermal stress caused during heating can be relaxed (see page 6, lines 4 and 5) and steam generated during a package reflow operation can be released through the foam or reticular structure (see page 6, lines 10-14).

Distinctions of Independent Claim 20 Over the Cited Prior Art

Independent claim 20 defines the following specific features:

"(1) a three layer buffer elastomer layer comprised of a structure having interconnected foams or three-dimensional reticular structure together with adhesive films on each side;

(2) the three layer buffer elastomer layer bonds the chip to the wiring formed side of a wiring layer (comprised of an insulating layer and wiring); and

(3) the claimed structure relaxes stress between the semiconductor chip and the package substrate during heating."

Referring to the primary cited reference to Newman, it can be seen that Newman has the following shortcomings in terms of meeting the above noted features of claim 20:

"(1) Newman's three layered structure (comprised of the thermally conductive polyimide electrical insulator 30 with the adhesive layers 24 and 34) is not the claimed "three layered buffer elastomer layer ... comprising a structure having interconnected foams or a three-dimensional reticular structure."

(2) Newman does not use his three layer structure to bond the chip100 (see Fig. 9) with a wiring layer. Instead, Newman's three layer wiring structure is bonded between a copper ground plane 20 and a B-stage epoxy resin 40.

(3) Newman provides no suggestion at all for using the three-layered structure to relax stress between the semiconductor chip and a package substrate during heating.

(4) Newman doesn't teach the claimed wiring layer being formed of an insulating film and a wiring, and, instead, utilizes a lead frame 52.

Thus, Newman has a different structure, located in a different place that does not perform the claimed function. In other words, Newman is a completely different device.

In order to arrive at the arrangement for a wiring tape defined in claim 20 of the present application, one would have to modify Newman as follows:

(a) change the three layered structure of Newman to use a structure of interconnected foams or three dimensional reticular structure;

(b) change Newman from using the three layered structure to bond between a copper ground plane and a B-stage epoxy resin to, instead, use it to bond a semiconductor chip to the wiring formed side of a wiring layer;

(c) construct the structure with appropriate materials to relax stress; and

(d) replace the lead frame structure of Newman with the claimed wiring layer using an insulator and wires.

In MPEP 2143.01, it is clearly stated:

"Obviousness can only be established by combining or modifying the teachings of prior art to produce the claimed invention where there is some teaching, suggestion or motivation to do so either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "

It is respectfully submitted that nothing in any of the cited references would provide such a motivation for the complete restructuring of Newman that would be necessary to arrive at the invention defined in independent claim 20.

In the Office Action, Schueller is first relied on for a teaching of substituting Newman's lead frame for wiring layer with an insulating layer and wiring. In the first place, it is not at all clear how one could modify Newman to do this to arrive at the invention defined by claim 20 Specifically, claim 20 defines that an adhesive layer of the buffer elastomer layer is bonded to "the wiring-formed side of the wiring layer." In Newman, the adhesive layer 34 is bonded to a B-stage epoxy resin. If one were to substitute the insulating layer/wiring layer of Schueller into the arrangement of Newman, what would one do with the B-stage epoxy resin layer 40 of Newman? As such, this points out what a different structure Newman actually is from the invention defined in claim 20.

Further, even if one were to make the modification proposed by somehow combining the insulator/wiring structure of Schueller with the structure of Newman, the other features of claim 20 would still be lacking. In other words, the combination would still lack the three layer buffer elastomer layer with foam or reticular structure, as well as the particular claimed location of this three layer structure between the chip and the wiring formed side of the wiring layer or the feature of relaxing stress between the chip and the package structure.

With regard to the "functional limitations" concerning the relaxation of stress during thermal heating found in claim 20, it is noted at the bottom of page 4 of the Office Action that the intended use or other types of functional language must result in a structural difference between the claimed invention and the prior art in order to

patentably distinguish over the prior art. With regard to this, attention is directed to MPEP 2173.05(g) which states that:

> "functional language does not, in and of itself, render a claim improper," and:
>
> " a functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step."

Examples are then given of functional language in MPEP 2173.05, together with a statement that said such a limitation, "although functional, was perfectly acceptable because it set definite boundaries on the patent protection sought."

In the present instance, it is noted that the claimed relaxation of thermal stress does, in fact, result from a structural difference between the claimed invention and the prior art, specifically, the structure utilizing foam for a reticular structure, together with the claimed specific location of the three layer structure as a bonding element between the chip and the package structure. Therefore, it is respectfully submitted that this language must, in fact, be considered, and, as such, serves to further distinguish the claim 20 over the cited prior art.

The Office Action goes on to cite the reference to Wakana, suggesting that this teaches the use of three-dimensional reticular material to improve elasticity and retain initial hardness and volume. More to the point, the Office Action states that the teachings of Wakana would make it obvious to one of ordinary skill in the art to modify Newman to use such material in place of the thermally conductive polyimide insulator 30 taught by Newman. Applicants respectfully traverse this for the following reasons.

In the first place, other than the applicants own disclosure, it is respectfully submitted that there is no teaching or suggestion in either Newman or Wakana to

make such a modification. Newman specifically teaches in column 3, line 18 et seq., that the insulating layer 30 "preferably comprises a polyimide film such as, for example, Kapton." The Newman specification goes on to note that "such materials are commercially available, for example, as alumina-filled polyimide films." As such, there is absolutely noting in Newman that would suggest using either interconnected foam or reticular material for the layer 30.

As for Wakana, it is respectfully submitted that this is simply a general teaching of reticular foam, without any suggestion for using such foam in a wiring tape such as Newman. In effect, Wakana merely shows that such reticular material was known. Applicants invention is not directed to the reticular material in and of itself. Instead, the applicants invention is directed to the use of an interconnected foam or reticular material in a specific wiring tape structure to use such foam or reticular material with adhesive layers on both sides to bond a chip to the wiring form side of a wiring layer to relax stress. It is respectfully submitted that there is no motivation whatsoever in either Wakana or Newman to utilize such reticular material for the insulating layer 30 of Newman. Again, the only suggestion for this comes from the applicants own disclosure. Of course, the use of the applicants own disclosure in the formulation of a rejection is completely improper.

With regard to this issue of obviousness, the Examiner is invited to consider the teachings found in the case of *in re Lee 61 USPO 2d 1430 (Fed. Cir. 2002).* In particular, in analyzing the propriety of combining two references, without any specific motivation in either of the references to do so, the CAFC stated:

> "With respect to Lees application, neither the Examiner nor the board adequately supported the selection and combination of the Nortrup and

> ThunderChopper references to render obvious that which Lee described. The Examiner's conclusory statements that "the demonstration mode is just a programmable feature which can be used in many different devices for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority. It is improper, in determining whether a person of ordinary skill in the art would have been led to this references, simply to "use that which the inventor taught against its teacher."

It is respectfully submitted that, in the present instance, the combination of Wakana and Newman amounts to the same type of combination attempted in the case of *in re Lee*. The only suggestion for such a combination comes from the inventor. Clearly, nothing in either Newman nor Wakana provides any motivation for the combination. Therefore, reconsideration and removal of the rejection of independent claim 20 over the combination of Newman, Schueller and Wakana is respectfully requested.

Distinctions of Independent Claim 24 over the Cited Prior Art.

Independent claim 24 contains substantially the same limitations found in independent claim 20, as well as the further feature of defining the relaxing of stress and releasing of steam pressure in a means plus function format. In addition to the above noted teachings concerning functional limitations set forth in MPEP 2173.05(g), it is noted that 35 USC §112, sixth paragraph, specifically authorizes claiming of functional features in terms of "means plus function" format. More specifically, the statutory language sets forth:

> "An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure,

material or acts in support thereof."

As such, the function for relaxing thermal stress and releasing steam pressure must be considered in the independent claim 24. As discussed above, absolutely nothing in any of the cited references teaches or suggests such a means for relaxing thermal stress and releasing steam pressure in a wiring tape for a semiconductor device. As such, there is nothing in any of the references that would motivate one to make the modification proposed in the Office Action to achieve these functions which were completely unrecognized in the cited prior art. Indeed, since the polyimide insulating material 30 of the primary reference to Newman is encapsulated by sealing material, it would be impossible to release the stream pressure generated during heating in a reflow operation as defined by claim 24. In addition, the polyimide insulating layer 40 of Newman has neither the elastic properties or the gas permeability which would be necessary to achieve these functions and, as noted above, there is no basis at all in the references to Schueller or Wakana for modifying this to achieve such functions. Therefore, reconsideration and allowance of independent claim 24 is also respectfully requested.

Distinctions of the Dependent Claims.

It is respectfully submitted that the dependent claims 21-23, 25, 26 and new dependent claims 27 and 28 serve to further define overall structures over the cited references. For example, dependent claim 21 defines a specific ratio to reduce likelihood of failure during heating performed in a reflow operation which is completely unsuggested by any of the cited documents. Arrival at this specific

relationship and its resulting function can only result from the teachings of the applicant, not the cited prior art.

These same features are also found in dependent claim 25.

Dependent claims 22, 23 and 26 define a process step of preparing a laminate by pasting both sides of the structure having the interconnected foams or three dimensional reticular structures with adhesive. With regard to this, although this is a process step, it is respectfully submitted that it leads to an improved product in comparison with the cited prior art. Specifically, this process contributes to the overall structure for the relaxation of stress. As noted in the case of *in re Luck, 177 USPQ 523:*

> "Product claims may include process steps to wholly or partially define claimed product; to extent these process limitations distinguish product over prior art, they must be given same consideration as traditional product characteristics."

Therefore, it is respectfully submitted that these dependent claims also serve to even further define the advantages of the present invention over the cited prior art.

Finally, new dependent claims 27 and 28 specifically define that the adhesive layers of the three layer structure are directly bonded to the semiconductor chip and the wiring layer. This is clearly different than the arrangement of the primary reference to Newman where the three layer structure is bonded on one end to a copper ground plane and, on the other end, to a B-stage epoxy resin. To modify the structure of Newman to meet the direct bonding limitations of these dependent claims 27 and 28 would require complete restructuring of Newman to eliminate the copper ground plane and the B-stage epoxy resin. Inasmuch as the title of the Newman patent is "Ground Plane For Plastic Encapsulated Integrated Circuit Die

Packages" and the entire description is directed to "a multilayer ground plane assembly", elimination of the copper ground plane 20 in Newman would go completely against the teachings of that references. Therefore, consideration and allowance of these new dependent claims 27 and 28 over the cited prior art is also respectfully requested.

Reconsideration and removal of the obviousness type double patenting rejection of claims 20-26 over claims 1-4, 12 and 17 of USP 6,433,440 is also respectfully requested. With regard to this matter, it is noted, at the outset, that the claims 1-4 and 12 and 17 of the parent U.S. Patent are all directed to a semiconductor device rather than a wiring tape for a semiconductor device. In addition, none of these claims from the parent patent teach or suggest the claimed feature of relaxing thermal stress generated between a semiconductor chip and a package substrate during heating and, of course, these claims do not teach or suggest the claimed "means for relaxing thermal stress generated between the semiconductor chip and the package substrate and for releasing steam pressure generated during heating in a reflow operation." As such, it is respectfully submitted that the claims of the present application contain clear distinctions over the claims of the parent patent, and, on this basis, reconsideration and removal of the obviousness type double patenting rejection is respectfully requested.

In addition, the claims of the parent U.S. Patent contain other limitations which are not found in the present claims, and, as such, clearly support the conclusion that the claims of the present application and the claims of the parent patent are directed

to two separate patentable inventions. For example, independent claims 1 and 17 specifically define the gas permeable structure of interconnected foams as well as a sealant for sealing connections of the terminals. These limitations result in a different overall combination from that defined by the present claims. Therefore, it is respectfully submitted that the present claims define a separate patentable invention from the patentable invention of the claims of the parent patent. Therefore, reconsideration and removal of the obviousness type double patenting rejection on this ground is also respectfully requested.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 500.36317CV2), and please credit any excess fees to such Deposit Account.

Respectfully submitted,
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